**3GPP TSG-RAN WG4 Meeting #111R4-2409880**

**Fukuoka, Japan, 20 - 24 May, 2024**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.174** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **18.4.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
|  | | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft CR on mIAB-MT radiated performance requirement (TS38.174 Rel-18) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_mobile\_IAB-Perf | | | | |  | ***Date:*** | | | 2024-05-13 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce mIAB-MT radiated performance requirement. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | For introducing mIAB-MT radiated performance requirement, add new clause 11.2.2B, 11.2.3B. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | There will be inconsist between specification and RAN4 agreements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 11.2.2B (New clause), 11.2.3B(New clause) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.176-1, 38.176-2 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | New clause: 11.2.2B, 11.2.3B | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Revision of R4-2408969 | | | | | | | | |

*<START OF THE CHANGE 1>*

11.2.2B Demodulation performance requirements for Mobile IAB

11.2.2B.1 Performance requirements for mIAB type 1-O

11.2.2B.1.1 Performance requirements for PDSCH

11.2.2B.1.1.1 General

The performance requirement of PDSCH is determined by a minimum required throughput for a given SNR. The required throughput is expressed as a fraction of maximum throughput for the FRCs listed in annex A. The performance requirements assume HARQ retransmissions.

**Table: 11.2.2B.1.1.1-1 Test parameters for PDSCH testing**

|  |  |  |
| --- | --- | --- |
| **Parameter** | | **Value** |
| Cyclic prefix | | Normal |
| Default TDD UL-DL pattern (Note 1) | | 7D1S2U, S=6D:4G:4U |
| HARQ | Maximum number of HARQ transmissions | 4 |
| RV sequence | 0, 2, 3, 1 |
| DM-RS | DM-RS configuration type | 1 |
| DM-RS duration | single-symbol DM-RS |
| DM-RS position (*l0*) | 2 |
| Additional DM-RS position | pos1 |
| Number of DM-RS CDM group(s) without data | 1 |
| DM-RS port(s) | {1000} |
| DM-RS sequence generation | NID0=0 |
| Time domain resource assignment | PDSCH mapping type | A |
| Start symbol | 2 |
| Allocation length | 12 |
| Frequency domain resource assignment | RB assignment | Full applicable test bandwidth |
| PT-RS configuration | | Not configured |
| PRB bundling size | | 2 |
| VRB-to-PRB mapping type | | Not interleaved |
| PDSCH & PDSCH DMRS Precoding configuration | | Single Panel Type I, Random precoder selection updated per slot, with equal probability of each applicable i1, i2 combination, and with PRB bundling granularity |
| Note 1: The same requirements are applicable to TDD with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed. | | |

11.2.2B.1.1.2 Minimum requirements

The throughput shall be equal to or larger than the fraction of maximum throughput for the FRCs stated in tables 11.2.2B.1.1.2-1 at the given SNR with the test parameters stated in Table 11.2.2B.1.1.1-1.

**Table 11.2.2B.1.1.2-1: Minimum performance for Rank 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Test num. | Reference channel | Bandwidth (MHz) / Subcarrier spacing (kHz) | Modulation format and code rate | Propagation condition | Correlation matrix and antenna configuration | Reference value | |
| Fraction of maximum throughput (%) | SNR (dB) |
| 1 | M-FR1-A.3.1-1 | 40 / 30 | 16QAM, 0.48 | TDLC300-100 | 2x2, ULA Low | 30 | 1.6 |
| 2 | M-FR1-A.3B.1-1 | 40 / 30 | QPSK, 0.30 | TDLB100-400 | 2x2, ULA Low | 70 | -1.0 |

11.2.2B.1.2 Performance requirements for PDCCH

11.2.2B.1.2.1 General

The receiver characteristics of the PDCCH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

**Table: 11.2.2B.1.2.1-1 Test parameters for PDCCH testing**

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| Cyclic prefix | Normal |
| Default TDD UL-DL pattern (Note 1) | 7D1S2U, S=6D:4G:4U |
| DM-RS sequence generation | NID=0 |
| Frequency domain resource allocation for CORESET | Start from RB = 0 with contiguous RB allocation |
| CCE to REG mapping type | Interleaved |
| Interleaver size | 3 |
| REG bundle size | 6 for test with aggregation level 8 2 for others |
| Shift Index | 0 |
| Slots for PDCCH monitoring | Each slot |
| Number of PDCCH candidates for the tested aggregation level | 1 |
| PDCCH Precoding configuration | Single Panel Type I, Random precoder selection updated per slot, with equal probability of each applicable i1, i2 combination with REG bundling granularity for number of Tx larger than 1 |
| Note 1: The same requirements are applicable to TDD with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed. | |

11.2.2B.1.2.2 Minimum requirements

The Pm-dsg shall be equal to or smaller than 1%, for the cases stated in Table 11.2.2B.1.2.2-1 at the given SNR with the test parameters stated in Table 11.2.2B.1.2.1-1.

**Table 11.2.2B.1.2.2-1: Minimum requirements for PDCCH with 30 kHz SCS**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Bandwidth (MHz)** | **CORESET RB** | **CORESET duration** | **Aggregation level** | **Reference Channel** | **Propagation Condition** | **Antenna configuration and correlation Matrix** | **Reference value** | |
| **Pm-dsg (%)** | **SNR (dB)** |
| 1 | 40 | 102 | 1 | 4 | M-FR1-A.3.4-2 | TDLC300- 100 | 1x2 Low | 1 | 3.0 |
| 2 | 40 | 90 | 1 | 8 | M-FR1-A.3.4-3 | TDLC300-100 | 2x2 Low | 1 | -1.2 |

11.2.2B.1.3 Performance requirements for PBCH

11.2.2B.1.3.1 General

The receiver characteristics of PBCH are determined by the probability of miss-detection of the PBCH (Pm-bch), which is defined as

Where A is the number of correctly decoded MIB PDUs and B is the number of transmitted MIB PDUs. The Pm-bch is derived with the assumption UE combines the PBCH symbols of the same SS/PBCH block index within the MIB TTI (80ms).

**Table: 11.2.2B.1.3.1-1 Test parameters for PBCH testing**

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Single antenna port |
| Physical Cell ID |  | 0 |
| Cyclic prefix |  | Normal |
| Number of SS/PBCH blocks within an SS burst set periodicity (Note 2) |  | 1 |
| SS/PBCH block index (Note 2) |  | 0 |
| SS/PBCH block periodicity (Note 2) | ms | 20 |
| Default TDD UL-DL pattern (Note 1) |  | FR1.30-1 |
| Note 1: The same requirements are applicable to TDD with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed. | | |

11.2.2B.1.3.2 Minimum requirements

The average probability of a miss-detected PBCH (Pm-bch) shall be below 1%, for the cases stated in Table 11.2.2B.1.3.2-1 and Table 11.2.2B.1.3.2-2 at the given SNR with the test parameters stated in Table 11.2.2B.1.3.1-1.

Table 11.2.2B.1.3.2-1: Minimum performance PBCH in case SS/PBCH block index is not known

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test number | Bandwidth (MHz) / Subcarrier spacing (kHz) | Reference channel | Propagation condition | Antenna configuration and correlation matrix | Reference value | |
| Pm-bch (%) | SNR (dB) |
| 1 | 40 / 30 | M.FR1-PBCH-1 | TDLA30-10 | 1 x 4 Low | 1 | -8.6 |

Table 11.2.2B.1.3.2-2: Minimum performance PBCH in case SS/PBCH block index is known

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test number | Bandwidth (MHz) / Subcarrier spacing (kHz) | Reference channel | Propagation condition | Antenna configuration and correlation matrix | Reference value | |
| Pm-bch (%) | SNR (dB) |
| 1 | 40 / 30 | M.FR1-PBCH-1 | TDLA30-10 | 1 x 4 Low | 1 | -9.6 |

11.2.2B.2 Performance requirements for mIAB type 2-O

11.2.2B.2.1 Performance requirements for PDSCH

11.2.2B.2.1.1 General

The performance requirement of PDSCH is determined by a minimum required throughput for a given SNR. The required throughput is expressed as a fraction of maximum throughput for the FRCs listed in annex A. The performance requirements assume HARQ retransmissions.

**Table: 11.2.2B.2.1.1-1 Test parameters for PDSCH testing**

|  |  |  |
| --- | --- | --- |
| **Parameter** | | **Value** |
| Cyclic prefix | | Normal |
| Default TDD UL-DL pattern (Note 1) | | 3D1S1U, S=10D:2G:2U |
| HARQ | Maximum number of HARQ transmissions | 4 |
| RV sequence | 0, 2, 3, 1 |
| DM-RS | DM-RS configuration type | 1 |
| DM-RS duration | single-symbol DM-RS |
| DM-RS position (*l0*) | 2 |
| Additional DM-RS position | pos1 |
| Number of DM-RS CDM group(s) without data | 1 |
| DM-RS port(s) | {1000} for rank 1  {1000, 1001} for rank 2 |
| DM-RS sequence generation | NID0=0 |
| Time domain resource assignment | PDSCH mapping type | A |
| Start symbol | 1 |
| Allocation length | 13 |
| Frequency domain resource assignment | RB assignment | Full applicable test bandwidth |
| PT-RS configuration | Frequency density (*KPT-RS*) | 2 |
| Time density (*LPT-RS*) | 1 |
| PRB bundling size | | 2 |
| VRB-to-PRB mapping type | | Not interleaved |
| PDSCH & PDSCH DMRS Precoding configuration | | Single Panel Type I, Random precoder selection updated per slot, with equal probability of each applicable i1, i2 combination, and with PRB bundling granularity |
| Note 1: The same requirements are applicable to TDD with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed. | | |

11.2.2B.2.1.2 Minimum requirements

The throughput shall be equal to or larger than the fraction of maximum throughput for the FRCs stated in Table 11.2.2B.2.1.2-1 and Table 11.2.2B.2.1.2-2 at the given SNR with the test parameters stated in Table 11.2.2B.2.1.1-1.

**Table 11.2.2B.2.1.2-1: Minimum performance for Rank 1 (FRC) for FR2-1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num** | **Reference channel** | Bandwidth (MHz) / Subcarrier spacing (kHz) | **Modulation and code rate** | **TDD UL-DL pattern** | **Propagation condition** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNRBB (dB)** |
| 1 | R.PDSCH.5-3.1 TDD | 100 / 120 | 64QAM, 0.46 | FR2.120-1 | TDLA30-300 | 2x2 XPL Medium | 70 | 12.4 |

Table 11.2.2B.2.1.2-2: Minimum performance for Rank 2 (FRC) for FR2-1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num** | **Reference channel** | Bandwidth (MHz) / Subcarrier spacing (kHz) | **Modulation and code rate** | **TDD UL-DL pattern** | **Propagation condition** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNRBB (dB)** |
| 1 | M-FR2-A.3.1-2 | 100 / 120 | 16QAM, 0.48 | FR2.120-1 | TDLA30-300 | 2x2 ULA Low | 70 | 14.4 |

11.2.2B.2.2 Performance requirements for PDCCH

11.2.2B.2.2.1 General

The receiver characteristics of the PDCCH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg).

**Table: 11.2.2B.2.2.1-1 Test parameters for testing PDCCH**

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| Cyclic prefix | Normal |
| Default TDD UL-DL pattern (Note 1) | 3D1S1U, S=10D:2G:2U |
| DM-RS sequence generation | NID=0 |
| Frequency domain resource allocation for CORESET | Start from RB = 0 with contiguous RB allocation |
| CCE to REG mapping type | Interleaved |
| Interleaver size | 2 for test with Aggregation level 4 3 for others |
| REG bundle size | 6 for test with Aggregation level 4 2 for others |
| Shift Index | 0 |
| Slots for PDCCH monitoring | Each slot |
| Number of PDCCH candidates for the tested aggregation level | 1 |
| PDCCH Precoding configuration | Single Panel Type I, Random precoder selection updated per slot, with equal probability of each applicable i1, i2 combination with REG bundling granularity for number of Tx larger than 1 |
| Note 1: The same requirements are applicable to TDD with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed | |

11.2.2B.2.2.2 Minimum requirements

The Pm-dsg shall be equal to or smaller than 1%, for the cases stated in Table 11.2.2B.2.2.2-1 at the given SNR with the test parameters stated in Table 11.2.2B.2.2.1-1.

**Table 11.2.2B.2.2.2-1: Minimum performance requirements with 120 kHz SCS for FR2-1**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Bandwidth (MHz)** | **CORESET RB** | **CORESET duration** | **Aggregation level** | **Reference Channel** | **Propagation Condition** | **Antenna configuration and correlation Matrix** | **Reference value** | |
| **Pm-dsg (%)** | **SNRBB (dB)** |
| 1 | 100 | 60 | 1 | 4 | M-FR2-A.3.4-2 | TDLA30-300 | 1x2 Low | 1 | 3.0 |

11.2.2B.2.3 Performance requirements for PBCH

11.2.2B.2.3.1 General

The receiver characteristics of PBCH are determined by the probability of miss-detection of the PBCH (Pm-bch), which is defined as

Where A is the number of correctly decoded MIB PDUs and B is the number of transmitted MIB PDUs. The Pm-bch is derived with the assumption UE combines the PBCH symbols of the same SS/PBCH block index within the MIB TTI (80ms).

**Table: 11.2.2B.2.3.1-1 Test parameters for PBCH testing**

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Single antenna port |
| Physical Cell ID |  | 0 |
| Cyclic prefix |  | Normal |
| Number of SS/PBCH blocks within an SS burst set periodicity (Note 2) |  | 1 |
| SS/PBCH block index (Note 2) |  | 0 |
| SS/PBCH block periodicity (Note 2) | ms | 20 |
| Default TDD UL-DL pattern (Note 1) |  | FR2.120-1 |
| Note 1: The same requirements are applicable to TDD with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed. | | |

11.2.2B.2.3.2 Minimum requirements

The average probability of a miss-detected PBCH (Pm-bch) shall be below 1%, for the cases stated in Table 11.2.2B.2.3.2-1 and Table 11.2.2B.2.3.2-2 at the given SNR with the test parameters stated in Table 11.2.2B.2.3.1-1.

Table 11.2.2B.2.3.2-1: Minimum performance PBCH in case SS/PBCH block index is not known

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Reference channel** | **Propagation condition** | **Antenna configuration and correlation matrix** | **Reference value** | |
| **Pm-bch (%)** | **SNRBB (dB)** |
| 1 | 100 / 120 | M.FR2-PBCH-1 | TDLA30-300 | 1 x 2 Low | 1 | -6.3 |
| 2 | 100 / 120 | M.FR2-PBCH-1 | TDLA30-650 | 1 x 2 Low | 1 | -4.5 |

Table 11.2.2B.2.3.2-2: Minimum performance PBCH in case SS/PBCH block index is known

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test number | Bandwidth (MHz) / Subcarrier spacing (kHz) | Reference channel | Propagation condition | Antenna configuration and correlation matrix | Reference value | |
| Pm-bch (%) | PBCH SNR (dB) |
| 1 | 100 / 120 | M.FR2-PBCH-1 | TDLA30-300 | 1 x 2 Low | 1 | -7.9 |

*<END OF THE CHANGE 1>*

*<START OF THE CHANGE 2>*

11.2.3B CSI reporting requirements for Mobile IAB

11.2.3B.1 Performance requirements for mIAB type 1-O

11.2.3B.1.1 General

This clause includes radiated requirements for the reporting of channel state information (CSI).

11.2.3B.1.1.2 Common test parameters

Parameters specified in Table 11.2.3B.1.1.2-1 are applied for all test cases in this clause unless otherwise stated.

**Table 11.2.3B.1.1.2-1: Test parameters for CSI test cases**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| PDSCH transmission scheme | |  | Transmission scheme 1 |
| Duplex Mode | |  | TDD |
| PTRS *epre-Ratio* | |  | 0 |
| Actual carrier configuration | Offset between Point A and the lowest usable subcarrier on this carrier (Note 3) | RBs | 0 |
| Subcarrier spacing | kHz | 120 |
| DL BWP configuration #1 | Cyclic prefix |  | Normal |
| RB offset | RBs | 0 |
| Number of contiguous PRB | PRBs | Maximum transmission bandwidth configuration as specified in clause 5.3.2 of TS 38.101-2 [4] for tested channel bandwidth and subcarrier spacing |
| Active DL BWP index | |  | 1 |
| PDSCH configuration | Mapping type |  | Type A |
| *k0* |  | 0 |
| Starting symbol (S) |  | 2 |
| Length (L) |  | 12 |
| PDSCH aggregation factor |  | 1 |
| PRB bundling type |  | Static |
| PRB bundling size |  | 2 |
| Resource allocation type |  | Type 0 |
| RBG size |  | Config2 |
| VRB-to-PRB mapping type |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size |  | N/A |
| PDSCH DMRS configuration | DMRS Type |  | Type 1 |
| Number of additional DMRS |  | 1 |
| DMRS ports indexes |  | {1000} for Rank1  {1000,1001} for Rank2 |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| Number of PDSCH DMRS CDM group(s) without data |  | 2 |
| PTRS configuration | Frequency density (*KPT-RS*) |  | 2 |
| Time density (*LPT-RS*) |  | 1 |
| Resource Element Offset |  | 2 |
| NZP CSI-RS for CSI acquisition | Frequency Occupation |  | Start PRB 0  Number of PRB = BWP size |
| Redundancy version coding sequence | |  | {0,2,3,1} |
| Physical signals, channels mapping and precoding | |  | As specified in Annex I.3.1 |
| Note 1: PDSCH is scheduled only on full DL slots without CSI-RS resource and TRS allocated.  Note 2: Point A coincides with minimum guard band as specified in Table 5.3.3-1 from TS 38.101-2 [4] for tested channel bandwidth and subcarrier spacing. | | | |

11.2.3B.1.2 Wideband Channel Quality Indicator (CQI) under fading conditions

11.2.3B.1.2.1 General

The purpose of the requirements is to verify that the UE is tracking the channel variations and selecting the largest transport format possible according to the prevailing channel state for the frequency non-selective scheduling.

The reporting accuracy of CQI under frequency non-selective fading conditions is determined by the reporting variance, the relative increase of the throughput obtained when the transport format is indicated by the reported CQI compared to the throughput obtained when a fixed transport format is configured according to the reported median CQI, and a minimum BLER using the transport formats indicated by the reported CQI. To account for sensitivity of the input SNR the reporting definition is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

**Table 11.2.3B.1.2.1-1: Test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | **Test 2** | |
| Bandwidth | | | MHz | 40 | | | |
| Subcarrier spacing | | | kHz | 30 | | | |
| Default TDD UL-DL pattern (Note 1) | | |  | 7D1S2U, S=6D:4G:4U | | | |
| SNRBB | | | dB | 6 | 7 | 12 | 13 |
| Propagation channel | | |  | TDLA30-5 | | | |
| Antenna configuration | | |  | 2×2  ULA High | | | |
| Beamforming Model | | |  | As specified in Annex I.3.1 | | | |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type | |  | *Periodic* | | | |
| Number of CSI-RS ports (*X*) | |  | 2 | | | |
| CDM Type | |  | *FD-CDM2* | | | |
| Density (ρ) | |  | 1 | | | |
| First subcarrier index in the PRB used for CSI-RS (k0) | |  | 6 | | | |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | 13 | | | |
| NZP CSI-RS-timeConfig  periodicity and offset | | slot | 10/1 | | | |
| ReportConfigType | | |  | *Periodic* | | | |
| CQI-table | | |  | Table 2 | | | |
| reportQuantity | | |  | *cri-RI-PMI-CQI* | | | |
| cqi-FormatIndicator | | |  | *Wideband* | | | |
| pmi-FormatIndicator | | |  | *Wideband* | | | |
| Sub-band Size | | | RB | 16 | | | |
| csi-ReportingBand | | |  | 1111111 | | | |
| CSI-Report periodicity and offset | | | slot | 10/9 | | | |
| Codebook configuration | | Codebook Type |  | *typeI-SinglePanel* | | | |
| Codebook Mode |  | 1 | | | |
| (CodebookConfig-N1,CodebookConfig-N2) |  | *Not configured* | | | |
| CodebookSubsetRestriction |  | 000001 | | | |
| RI Restriction |  | N/A | | | |
| CQI/RI/PMI delay | | | ms | 9.5 | | | |
| Maximum number of HARQ transmission | | |  | 1 | | | |
| Measurement channel | | |  | [As specified in Table A.3.5-1, M-FR1-A.3.5-1] | | | |
| Note 1: The same requirements are applicable to with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed.  Note 3: If the IAB-MT reports in an available uplink reporting instance at slot #n based on CQI estimation at a downlink slot not later than slot#(n-4), this reported CQI cannot be applied at the gNB downlink before slot#(n+4). | | | | | | | |

11.2.3B.1.2.2 Minimum requirements

For the parameters specified in Table 11.2.3B.1.2.1-1 and using the downlink physical channels specified in Annex A, the minimum requirements are specified by the following:

a) A CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least *α*% of the time where *α*% is specified in Table 11.2.3B.1.2.2-1;

b) The ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be ≥ *γ*, where *γ* is specified in Table 11.2.3B.1.2.2-1;

c) When transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater than or equal to 0.02.

**Table 11.2.3B.1.2.2-1 Minimum requirements**

|  |  |  |
| --- | --- | --- |
|  | **Test 1** | **Test 2** |
| ** [%] | 2 | 2 |
| ** | 1.05 | 1.05 |

11.2.3B.1.3 Sub-band Channel Quality Indicator (CQI) under fading conditions

11.2.3B.1.3.1 General

The purpose of the requirements is to verify that the preferred sub-bands can be used for frequency-selective scheduling under the frequency-selective fading conditions.

The accuracy of sub-band channel CQI reporting under the frequency-selective fading conditions is determined by a double-sided percentile of the reported differential CQI offset level 0 per sub-band, and the relative increase of the throughput obtained when transmitting the transport format indicated by the corresponding reported sub-band CQI on a randomly selected sub-band among the sub-bands with the highest reported differential CQI offset level compared to the throughput when transmitting a fixed transport format according to the wideband CQI median on a randomly selected sub-band among all the sub-bands. To account for sensitivity of the input SNR the sub-band CQI reporting under frequency selective fading conditions is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

**Table 11.2.3B.1.3.1-1: Test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | **Test 2** | |
| Bandwidth | | | MHz | 40 | | | |
| Subcarrier spacing | | | kHz | 30 | | | |
| Duplex Mode | | |  | TDD | | | |
| Default TDD UL-DL pattern (Note 1) | | |  | 7D1S2U | | | |
| Special Slot Configuration | | |  | 6D+4G+4U | | | |
| SNR | | | dB | 8 | 9 | 14 | 15 |
| Propagation channel | | |  | Two tap model specified in Annex B.2.4 with *a*=1, *f*D = 5Hz, and τd=0.1125μs | | | |
| Antenna configuration | | |  | 2×2 | | | |
| Correlation configuration | | |  | As per Annex B.1 | | | |
| Beamforming Model | | |  | As specified in Annex I.3.1 | | | |
| ZP CSI-RS configuration | CSI-RS resource Type | |  | Periodic | | | |
| Number of CSI-RS ports (*X*) | |  | 4 | | | |
| CDM Type | |  | FD-CDM2 | | | |
| Density (ρ) | |  | 1 | | | |
| First subcarrier index in the PRB used for CSI-RS (k0) | |  | Row 5,4 | | | |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | 9 | | | |
| CSI-RS  periodicity and offset | | slot | 10/1 | | | |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type | |  | Periodic | | | |
| Number of CSI-RS ports (*X*) | |  | 2 | | | |
| CDM Type | |  | FD-CDM2 | | | |
| Density (ρ) | |  | 1 | | | |
| First subcarrier index in the PRB used for CSI-RS (k0) | |  | Row 3,(6) | | | |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | 13 | | | |
| NZP CSI-RS-timeConfig  periodicity and offset | | slot | 10/1 | | | |
| CSI-IM configuration | CSI-IM resource Type | |  | Periodic | | | |
| CSI-IM RE pattern | |  | 0 | | | |
| CSI-IM Resource Mapping  (kCSI-IM,lCSI-IM) | |  | (4, 9) | | | |
| CSI-IM timeConfig  periodicity and offset | | slot | 10/1 | | | |
| ReportConfigType | | |  | Aperiodic | | | |
| CQI-table | | |  | Table 2 | | | |
| reportQuantity | | |  | cri-RI-PMI-CQI | | | |
| timeRestrictionForChannelMeasurements | | |  | Not configured | | | |
| timeRestrictionForInterferenceMeasurements | | |  | Not configured | | | |
| cqi-FormatIndicator | | |  | Subband | | | |
| pmi-FormatIndicator | | |  | Wideband | | | |
| Sub-band Size | | | RB | 16 | | | |
| csi-ReportingBand | | |  | 1111111 | | | |
| CSI-Report periodicity and offset | | | slot | Not configured | | | |
| Aperiodic Report Slot Offset | | |  | 8 | | | |
| CSI request | | |  | 1 in slots i, where mod(i, 10) = 1, otherwise it is equal to 0 | | | |
| reportTriggerSize | | |  | 1 | | | |
| CSI-AperiodicTriggerStateList | | |  | One State with one Associated Report Configuration  Associated Report Configuration contains pointers to NZP CSI-RS and CSI-IM | | | |
| aperiodicTriggeringOffset | | |  | Not configured | | | |
| Codebook configuration | | Codebook Type |  | typeI-SinglePanel | | | |
| Codebook Mode |  | 1 | | | |
| (CodebookConfig-N1,CodebookConfig-N2) |  | Not configured | | | |
| CodebookSubsetRestriction |  | 000001 | | | |
| RI Restriction |  | N/A | | | |
| Physical channel for CSI report | | |  | PUSCH | | | |
| CQI/RI/PMI delay | | | ms | 9.5 | | | |
| Maximum number of HARQ transmission | | |  | 1 | | | |
| Measurement channel | | |  | TBD | | | |
| Note 1: The same requirements are applicable to with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed.  Note 3: If the IAB-MT reports in an available uplink reporting instance at slot #n based on CQI estimation at a downlink slot not later than slot#(n-4), this reported CQI cannot be applied at the gNB downlink before slot#(n+4). | | | | | | | |

11.2.3B.1.2.2 Minimum requirements

For the parameters specified in Table 11.2.3B.1.2.1-1 and using the downlink physical channels specified in Annex A, the minimum requirements are specified by the following:

a) A sub-band differential CQI offset level of 0 shall be reported at least α% of the time but less than β% of the time for each sub-band, where α and β are specified in Table 11.2.3B.1.2.2-1;

b) The ratio of the throughput obtained when transmitting the corresponding transport format on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level and that obtained when transmitting the transport format indicated by the reported wideband CQI median on a randomly selected sub-band among all the sub-bands shall be ≥ *γ*, where *γ* is specified in Table 11.2.3B.1.2.2-1;

c) When transmitting the corresponding transport format on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level, the average BLER for the indicated transport format shall be greater than or equal to 0.02.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each available downlink transmission instance for TDD.

**Table 11.2.3B.1.2.2-1 Minimum requirements**

|  |  |  |
| --- | --- | --- |
|  | **Test 1** | **Test 2** |
| ** [%] | 2 | 2 |
| *β* [%] | 55 | 55 |
| ** | 1.05 | 1.05 |

11.2.3B.2 Performance requirements for mIAB type 2-O

11.2.3B.2.1 General

This clause includes radiated requirements for the reporting of channel state information (CSI).

11.2.3B.2.1.2 Common test parameters

Parameters specified in Table 11.2.3B.2.1.2-1 are applied for all test cases in this clause unless otherwise stated.

**Table 11.2.3B.2.1.2-1: Test parameters for CSI test cases**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| PDSCH transmission scheme | |  | Transmission scheme 1 |
| Duplex Mode | |  | TDD |
| PTRS *epre-Ratio* | |  | 0 |
| Actual carrier configuration | Offset between Point A and the lowest usable subcarrier on this carrier (Note 3) | RBs | 0 |
| Subcarrier spacing | kHz | 120 |
| DL BWP configuration #1 | Cyclic prefix |  | Normal |
| RB offset | RBs | 0 |
| Number of contiguous PRB | PRBs | Maximum transmission bandwidth configuration as specified in clause 5.3.2 of TS 38.101-2 [4] for tested channel bandwidth and subcarrier spacing |
| Active DL BWP index | |  | 1 |
| PDSCH configuration | Mapping type |  | Type A |
| *k0* |  | 0 |
| Starting symbol (S) |  | 2 |
| Length (L) |  | 12 |
| PDSCH aggregation factor |  | 1 |
| PRB bundling type |  | Static |
| PRB bundling size |  | 2 |
| Resource allocation type |  | Type 0 |
| RBG size |  | Config2 |
| VRB-to-PRB mapping type |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size |  | N/A |
| PDSCH DMRS configuration | DMRS Type |  | Type 1 |
| Number of additional DMRS |  | 1 |
| DMRS ports indexes |  | {1000} for rank 1  {1000, 1001} for rank 2 |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| Number of PDSCH DMRS CDM group(s) without data |  | 2 |
| PTRS configuration | Frequency density (*KPT-RS*) |  | 2 |
| Time density (*LPT-RS*) |  | 1 |
| Resource Element Offset |  | 2 |
| NZP CSI-RS for CSI acquisition | Frequency Occupation |  | Start PRB 0  Number of PRB = BWP size |
| Redundancy version coding sequence | |  | {0,2,3,1} |
| Physical signals, channels mapping and precoding | |  | As specified in Annex I.3.1 |
| Note 1: PDSCH is scheduled only on full DL slots without CSI-RS resource and TRS allocated.  Note 2: Point A coincides with minimum guard band as specified in Table 5.3.3-1 from TS 38.101-2 [4] for tested channel bandwidth and subcarrier spacing. | | | |

11.2.3B.2.2 Wideband Channel Quality Indicator (CQI) under fading conditions

11.2.3B.2.2.1 General

The purpose of the requirements is to verify that the UE is tracking the channel variations and selecting the largest transport format possible according to the prevailing channel state for the frequency non-selective scheduling.

The reporting accuracy of CQI under frequency non-selective fading conditions is determined by the reporting variance, the relative increase of the throughput obtained when the transport format is indicated by the reported CQI compared to the throughput obtained when a fixed transport format is configured according to the reported median CQI, and a minimum BLER using the transport formats indicated by the reported CQI. To account for sensitivity of the input SNR the CQI reporting under frequency non-selective fading conditions is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

**Table 11.2.3B.2.2.1-1: Test parameters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | | **Test 2** | |
| Bandwidth | | | MHz | 100 | | | |
| Subcarrier spacing | | | kHz | 120 | | | |
| Duplex Mode | | |  | TDD | | | |
| Default TDD UL-DL pattern (Note 1) | | |  | 3D1S1U | | | |
| Special Slot Configuration | | |  | 10D+2G+2U | | | |
| SNRBB | | | dB | 6 | 7 | 12 | 13 |
| Propagation channel | | |  | TDLA30-35 | | | |
| Antenna configuration | | |  | 2×2  ULA High | | | |
| Beamforming Model | | |  | As specified in Annex I.3.1 | | | |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type | |  | *Periodic* | | | |
| Number of CSI-RS ports (*X*) | |  | 2 | | | |
| CDM Type | |  | *FD-CDM2* | | | |
| Density (ρ) | |  | 1 | | | |
| First subcarrier index in the PRB used for CSI-RS (k0) | |  | 6 | | | |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | 13 | | | |
| NZP CSI-RS-timeConfig  periodicity and offset | | slot | 5/1 | | | |
| ReportConfigType | | |  | *Periodic* | | | |
| CQI-table | | |  | Table 1 | | | |
| reportQuantity | | |  | *cri-RI-PMI-CQI* | | | |
| cqi-FormatIndicator | | |  | *Wideband* | | | |
| pmi-FormatIndicator | | |  | *Wideband* | | | |
| Sub-band Size | | | RB | 8 | | | |
| csi-ReportingBand | | |  | 111111111 | | | |
| CSI-Report periodicity and offset | | | slot | 5/4 | | | |
| Codebook configuration | | Codebook Type |  | *typeI-SinglePanel* | | | |
| Codebook Mode |  | 1 | | | |
| (CodebookConfig-N1,CodebookConfig-N2) |  | *Not configured* | | | |
| CodebookSubsetRestriction |  | 000001 | | | |
| RI Restriction |  | N/A | | | |
| CQI/RI/PMI delay | | | ms | 1.75 | | | |
| Maximum number of HARQ transmission | | |  | 1 | | | |
| Measurement channel | | |  | [As specified in Table A.2.6-3, M-FR2-A.3.5-2] | | | |
| Note 1: The same requirements are applicable to with different UL-DL patterns.  Note 2: SSB, TRS, CSI-RS, and/or other unspecified test parameters with respect to TS 38.101-4 [28] are left up to test implementation, if transmitted or needed.  Note 3: If the IAB-MT reports in an available uplink reporting instance at slot #n based on CQI estimation at a downlink slot not later than slot#(n-4), this reported CQI cannot be applied at the gNB downlink before slot#(n+4). | | | | | | | |

11.2.3B.2.2.2 Minimum requirements

For the parameters specified in Table 11.2.3B.2.2.1-1 and using the downlink physical channels specified in Annex A, the minimum requirements are specified by the following:

a) a CQI index not in the set {median CQI -1, median CQI, median CQI +1} shall be reported at least α % of the time, where α% is specified in Table 11.2.3B.2.2.2-1;

b) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be ≥ γ, where γ is specified in Table 11.2.3B.2.2.2-1;

c) when transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.01.

**Table 11.2.3B.2.2.2-1 Minimum requirements**

|  |  |  |
| --- | --- | --- |
|  | **Test 1** | **Test 2** |
| ** [%] | 2 | 2 |
| ** | 1.05 | 1.05 |

*<END OF THE CHANGE 2>*